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Published by the Directorate of Mechanical Maintenance, N.D.H.Q., Ottawa, Canada

VOLUME 1 NUMBER 2 NOVEMBER 1943

EXHAUST

"There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune."—Shakespeare.

FOUR years is a long time to wait for the flood tide. The blood, sweat and tears of that four years have been borne by the stout hearted people of that tight little island across the sea. The tide has now turned and the opportunity for we men of the Canadian Army to show our stuff has arrived.

Are we fully prepared to take advantage of this situation?

No longer are we handicapped by shortages of material or inadequate facilities to do the job expected of us.

Everyone of you men of overseas age and medical category may at any time find yourselves in distant lands. Are you prepared to carry on efficiently the good work which has been so nobly exemplified by the 1st Canadian Division in Sicily.

We can only take advantage of this flood tide and the good fortune which it presages if we are prepared each and every one of us, individually and collectively, to efficiently carry out our allotted tasks.

You men who are driving and maintaining the vehicle equipment of our Canadian Army have a grave responsibility. It may be said that in all theatres of war the success of our forces is dependent upon the mobility of men and material. All the brains of our strategists and tacticians will go for nought if the personnel and material required to carry out their plans fails to reach its appointed destination on time.

"Get 'em rolling and keep 'em rolling" should be the battle slogan of all M.T. Men in the Canadian Army.

BEWARE OF COMPLACENCY. One or two small successes do not mean the end of a war. The biggest and toughest part of the fight lies ahead. You men will be needed. Get yourselves fighting fit, keep your vehicles fighting fit and when you face the supreme test you will not fail.

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CAM is published month in the interests of Preventi Maintenance, and direct to the non-commissioned o cers and men of the Canadi Army.

Your contributions articles and ideas a welcome. Address all corr pondence to the Editor, **CA** Directorate of Mechani Maintenance, Department National Defence, Ottawa.

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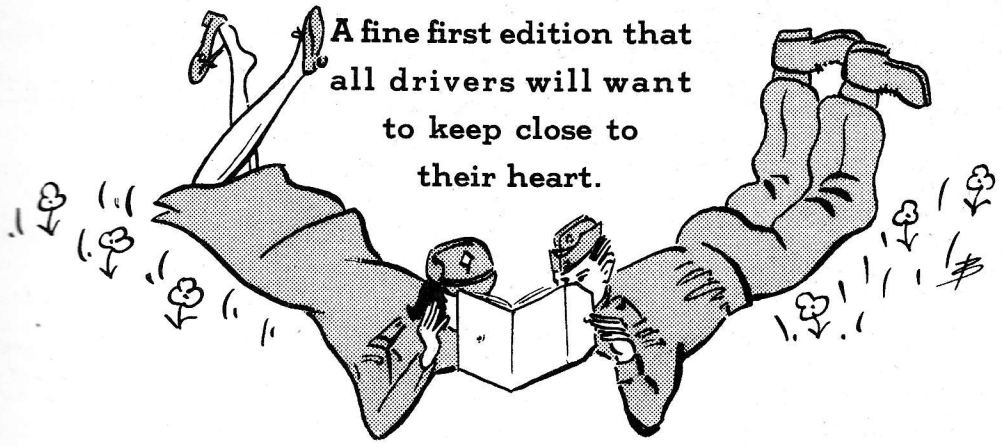

THE NEW DRIVER'S HANDBOOK

There was a day when drivers were often mistaken for hotel porters or red caps. They went about so loaded down with task systems, standing orders, trip sheets, accident report forms, P.M. Instructions booklets, worried looks and so on that the M.O.s had hundreds of cases of acute round shoulders to deal with.

Something had to be done, after several men had reported in with fractured skulls trying to figure out which to use and when.*

So came to pass the new, natty-bound "Regulations for Drivers of M.T. Vehicles, Universal Carriers and Motorcyclists" that a fellow with large brown eyes showed to us the other day and which he let drop right into the middle of our new cover design in crafty publicity trick on his part.

"What's the low down on this new drivers' digest?" we asked, hoping he'd go away and not bother us.

"Well, in the first place, it's got everything," he says, "and in the second place it tells everything. At one fell swoop it eliminates and supersedes the following publications: Task System for Inspection, Maintenance and Care of Army M.T. Vehicles (Wheeled) and Motorcycles, Standing Orders (1942) and Driver's P.M. Instructions. All is contained within its attractive maroon, double fold, waterproof, shockproof, non-magnetic, snap fastener cover!"

"A Fuller brush man before he enlisted," we mentally note.

"The driver's permit and identification is in the front and on page 4 is a place for a record of accidents — the only page in the book that looks its best with a minimum of data on it, and by a strange coincidence it is often found that an intelligent and alert look about the driver creates a blank look about this page. The standing orders themselves are contained in the first 28 pages of the book, thereby eliminating one of the booklets that formerly contained these vital statistics. The standing orders are the latest up-to-date dope on everything from what to do in case of fire to a picture of how Flash Gordon waves his hand when he wants to turn right."

"Amazing," we say, stifling a yawn, "the book's almost human."

"It's more than that," says Brown Eyes, "it even has two appendix's which is more than you have."

"Tsk, tsk," (we ignore the bad grammar).

"Appendix A," he explains, "deals with Preventive Maintenance and takes each item that's listed on your C.P.M.S. 1, 2 and 3 and in clean simple language tells all. For instance, take C.P.M.S. No. 1 for "B" vehicles — item 2 asks 'is Fan Belt Tension correct?' instead of you having to answer "how the hell do I know" — you just open up your little red volume to page 32 and read off in a firm voice — "Press on belt with finger midway between the pulleys, making sure it deflects ½" to ¾". Check for frayed or worn condition. Check fan for bent blades or loose rivets."

"Well, waddayaknow," we murmur, enthusiastically picking our teeth.

"And further more," says the guy, "in the back of the book there are beautiful pictures (suitable for framing) of the tools carried in the vehicles, so that if you happen to have forgotten what a hammer looks like you can find out without opening up the tool box — and incidently, get a good idea of what you should find in the tool box when you do open it up for a more practical reason. Along with these all-revealing views of the tools, you'll also find pictures of the new C.P.M.S. forms that combine the schedules with a Transport Work Ticket and M.T. Drivers Daily Report — all on one sheet of paper (a master stroke of genius). You

don't try to use the pictures in the books, as the kind N.C.O. will provide a new life-size C.P.M.S., in your favourite colour, fresh every day for you to use. Just one form now does the trick for you instead of the former two — it's very simple."

"So are you," we said abstractly, "but pray, do go on."

"Appendix B finishes up the book and covers **Operation.** Pages 48 to 55 are nothing more than good sound fatherly advice on what a good driver already knows but will read again carefully and often— and what a poor driver should know and learn. Here's the dope's chance to get the dope straight."

"Sounds like a good proposition," we said, "who are the lucky so and sos that get this fine folder?"

"Every driver of D.N.D. Motor vehicles, Universal Carriers and Motorcyclists — from privates to Field Marshals. They must be carried at all times on the person, as inquisitive provosts, or R.P's often like to have a look at them— they seem to hold a strange fascination for these gentlemen, in fact, provosts have been known to get very upset if you can't oblige their curiosity. Perhaps it's the expensive looking cover, or maybe because the book is better than anything that ever previously met their quizical gaze."

"Well, thanks for the lowdown," we said, smothering another yawn.

"That's O.K.," says Brown Eyes, slipping into his hat, "just one other thing before I go — be sure to slip an accident report form into the pocket of the folder. It's a good safe place to keep it and it's always there — in case of accident y'know, cheerio!"

"Hooray!," we said, as we quietly settle back to our fitful dozing.

A couple of heavy thoughts hit us apropos of what we've just told you above.

The new driving permit now classifies the various driver's qualifications. That means, if you are qualified to operate only standard "B" vehicles, **don't** monkey with Motorcycles, Universal Carriers or Tank Transporters.

Stay away from vehicles that are not covered by **your** permit.

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CARBON MONOXIDE

Back in the Stone Age, they would frequently find a guy lying dead in his cave for no reason that anybody could make out. Young, healthy guys, too—with no club or claw marks and no snake bites.

Today, they also find guys dead in their closed truck-cabs or garages. Young, healthy guys— also with no claw, club or snake bites. But today we know the reason.

Carbon monoxide.

The Stone Age guy died from the carbon monoxide gas that poured forth from his poorly ventilated camp-fire. Any carbonaceous material that burns slowly or without complete combustion gives off carbon moxonide.

Guys die today because this odourless, colourless, merciless, gas creeps up into the cab from leaks in the exhaust system; or because they linger too long in closed shops or garages with the doors closed and the engine running.

It's a twice-told tale which you probably heard a dozen times.

It begins with incomplete combustion—incomplete combustion is what you get in your engine.

It takes a ratio of 15 pounds of air to 1 pound of gasoline to get complete combustion. But that doesn't give power.

To get power, you need a ratio of 12½ to 13½ pounds of air to one pound of gasoline which yields about 75% or 85% of complete combustion. A by-product is Carbon monoxide. It's supposed to be carried away by the exhaust pipe.

But with leaks in the pipe, the carbon monoxide is aimed right up at the driver sitting in his closed cab. And then a strange and fearsome thing happens.

The carbon monoxide is breathed in by the driver along with air. And the hemoglobin (the red stuff in the blood that's supposed to pick up the oxygen and feed it to the tissues) picks up carbon monoxide 200 times faster than it picks up oxygen.

The hemoglobin can't pass the carbon monoxide on to the tissues. Carbon monoxide is a stable compound and likes to stick around. So it stays in the bloodstream and there's no room for oxygen. The tissues slowly starve—the brain and the heart are the first to go.

As if that isn't bad enough, carbon monoxide comes to the bloodstream for keeps. Like a poor relative, you can't get rid of it. You die. Years later, doctors can open you up and discover traces of carbon monoxide in what was your bloodstream.

Gruesome, ain't it?

But all jokes aside, it's time to get up your guard against the gas you cannot taste, see or smell. Don't take a nap in a truck cab with the windows shut and the engine running to keep you warm. They may not be able to wake you up.

Watch out for leaky mufflers, exhaust pipes and gaskets—have them repaired or replaced. Don't work on your truck in a closed building with the engine running.

You're too young to be carbonated.

STORAGE

PRESERVE 'EM RIGHT . . . AND THEY'LL KEEP LIKE MAMMY'S HOME MADE PICKLES!

Winter time is sludge time. You often run your vehicle on short errands and then park it. The latter cold cools the hot engine quickly and just like the sweat that grows on the cold pipes running through hot rooms, little drops of water spring up all over the inner surfaces of the engine, then run down and mingle with the oil in the crankcase.

It looks like Gremlin's work, but it's only condensation. Long runs make the engine hot enough to evaporate it off; short runs pile it up. In no time at all you have a harmful mess in the crankcase that goes by the descriptive name of "Sludge."

So if you're in a cold weather zone (and who isn't) and your vehicles are used for very short runs or hardly at all — get as many of them as possible into storage.

We have heard mention of the system of running the trucks a few minutes or miles each day to keep them in shape. Let's say right now that this is sabotage and nothing more. The only thing this does is form more sludge, more acid, and the headaches reach the proportions of hangover intensity.

Of course long periods in storage can hurt a Vehicle. Rust and corrosion attack metal surfaces — batteries drain and die — tires grow old before their time — gasoline gets stale and gummy — and slow death sets in fast.

For this reason a small group of bald headed men have been staying up nights to figure out ways and means of preventing stored vehicles from falling into decline and decay. The results of these nocturnal labours, apart from a dissipated expression on their faces, are set forth in the form of recent bulletins now in the field ("B" Vehicles S.I. A-4 and Wheeled "A" Vehicles S.I.63).

So if you have vehicles that won't be on the road "Sunday, Monday and Always" fix them up pretty like the bulletins say. If you've already got your hands on these bulletins you'll see that they are a pretty complete check list of procedure and fatherly advice covering Limited and Dead storage and cover the subject from where to store vehicles to what to do for each component of the vehicle.

One or two little points might be emphasized, f'rinstance, the simple job of draining the cooling system for dead storage. Don't just open a drain cock under the radiator and expect to drain the cooling system — some vehicles (like the Lynx Scout Car above Serial No. 585) have two drain cocks — and most vehicles have a drain cock (or cocks) in the block. And don't forget that drain cocks are easily and often plugged with sediment or rust so test them with a piece of wire when the liquid stops flowing. Heaters and overflow tanks must also be thoroughly drained while you're at it — it's amazing how often they're forgotten.

Another matter is the releasing of the clutch — use a **small** block of wood between the clutch pedal arm and the underside of the floor boards to hold the clutch out of engagement. The block only needs to be large enough to hold the clutch faces apart — don't block the pedal right down to the floor boards as this puts unnecessary strain on the clutch springs.

Oh yes — don't forget about the vehicle altogether once it's tucked away. If it's in **limited** storage for not more than a month it's a good idea to take a look at the battery once a week and in severe weather keep the specific gravity reading above 1.250 — or she'll freeze up on you sure as Harry. If the battery is down — and needs water, don't add water and run the engine to recharge it — use a portable charger, or take the battery out for recharge if necessary.

Finally — follow the instructions in the bulletins and do the job thoroughly so that when the vehicle comes out of Hibernation there'll be no load of grief staring you in the face.

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OIL.... ENGINE, HEAVY DUTY

JOIN THE REGULARS —IT'S NOT HARD TO TAKE!

When to Drain

Come on now — how often do you change your crankcase oil? Every 500 miles? — 1,000 miles? —2,000 miles? — on odd Thursdays?

Whenever it is, chances are that you're not too far off the beam—because the crankcase drain period is affected by a whole flock of conditions. The age and design of the engine, type of vehicle it's in, the load, weather, terrain, kind of operation (whether fast or slow, continuous, or off-and-on) — and the driver and the way he drives. All these are factors in the situation.

So it's not surprising if some greaseballs fix their own drain periods by fingering, sniffing, and tasting the oil — in addition to giving it a look-see. How else, they stammer, is a guy to know.

Well, it isn't quite as haphazard as all that. In the first place, you're supposed to string along with your Canadian Army Lubrication Guides — which prescribe an oil change for wheeled vehicles every 1,000 miles. (In the case of "A" Vehicles — use their authorized lubrication charts.) Of course, that figure applies to average operating conditions. For extreme service in dust, sand or water — or for off-and-on use in cold weather —the mileage between oil changes should be reduced.

Remember that actual operating conditions, not hard-and-fast rules, determine when a crankcase should be drained. Military vehicles (and who should know better than you) take a beating far beyond anything encountered in normal commercial operations. It's quite possible, in certain extremes, that you might have to change your oil every day. Anytime you find obvious contamination, such as grit or sand, it's time to change your Oil Engine Heavy Duty. In any case, crank or otherwise, when you're faced with the choice of ruining the engine or changing the oil—brother, change the oil!

You shouldn't be faced with that choice too often. If you are, go after the cause of the trouble. Maybe somebody is handling your Oil Engine Heavy Duty carelessly, exposing it to dirt before it goes into the crankcase. Maybe your oil filter is not being kept up to snuff. During every 1,000-mile drain job, you know, the oil filter drain plug should be removed—to clean out any old dirt, water, Nazis, Japs, or other foreign matter, which has collected at the bottom of the filter. The filter element should be checked and replaced by a new one, if necessary, after you've washed out the filter case with solvent.

As you've no doubt gathered by now, there's no absolute fixed drain period for all vehicles and conditions.

How to Drain

Draining crankcase oil is a push-over for a big boy like you — but there's a lot more to it than just removing a plug and letting the stuff run out. The main points to remember are six:—

1. Drain Oil Engine H.D. only when the engine is hot. That's not done just for the hell of it, either. It happens that many oil contaminants (dirt, sand, fuel, lead from gasoline, water, carbon, or other products of the natural deterioration of oil) are not intercepted by the oil filter, but keep churning around in the crankcase. The only way to get rid of these contaminants (which are the big reason for changing) is to drain them out with the oil. And the only way to do that is to drain the oil while all such stuff is in suspension. The detergent in the oil dissolves gums, varnish, and other carbon binders — so don't add any concoction of your own to help do the job. Just remember to drain while the engine is thoroughly warm — never more than 15 minutes after it's stopped running.

2. Drain the engine and oil filter completely. Remove the crankcase drain plug — and go about your other lubrication business

(Continued on Page 31)

For B.F.s

A PICTURE OF YOU . . .

It is an old saying in the motor trade that you can judge a driver by his vehicle. Unfortunately, that is as far as it goes. You can judge him, but you can't pass sentence.

The evidence in the case is usually circumstantial. Most of it consists of squeaks, rattles and groans—noises which come from loose bonnet flaps, insecure tail-boards and unoiled hinges; noises which spell Wear, with a capital "W."

We know they're not all mentioned in the instruction book. But that is no alibi. They arise not so much from neglect of routine preventive maintenance as from an apathetic lack of interest which prevents the driver from going an inch **beyond** the printed word.

We want you to take a **genuine** interest in your vehicles. We want you to feel proud when you take them out — as proud as you feel when you take your best girl out. You don't parade **her** with her coat torn, her face unwashed and her furbelows (whatever they are) undone. At least, we hope you don't.

Squeaks, rattles and groans are **not** natural noises on a vehicle. When you hear them, something is wrong, and the longer it remains wrong the harder (and more expensive) it is to put it right. If you **must** have a rattle, we'll send you one with little brass bells on it and a big safety pin. Then you can make as much noise as you like without running up a repair bill in the process.

" . . . That is as far as it goes . . . "

In the meantime, get into the habit of turning your vehicles out in fighting trim. Check the body and spring bolts from time to time. Use the oil can regularly on hinges, locks and slam plates. Run over the screws and nuts under the bonnet with screw-driver and spanner. Make sure that everything is as the manufacturers intended it to be — **as you'd** like it to be if double pay were offered to conscientious drivers.

The same thing goes for cleanliness. Some of the drivers we have known in peace-time have polished the engine parts under the bonnet until you could see to shave in the rocker cover. We aren't asking you to go as far as that, but if you can do enough to see the rocker cover at all it will help.

Cleanliness, as the schoolboy said, is next to impossible. Nevertheless, it is vitally important in a piece of machinery. A mud pack may do all sorts of wonderful things to a woman's face, but it doesn't help a motor vehicle either to look younger or last longer. So, take your cue from the sergeants' mess and — keep it clean.

" . . . You could see to shave in the rocker cover . . . "

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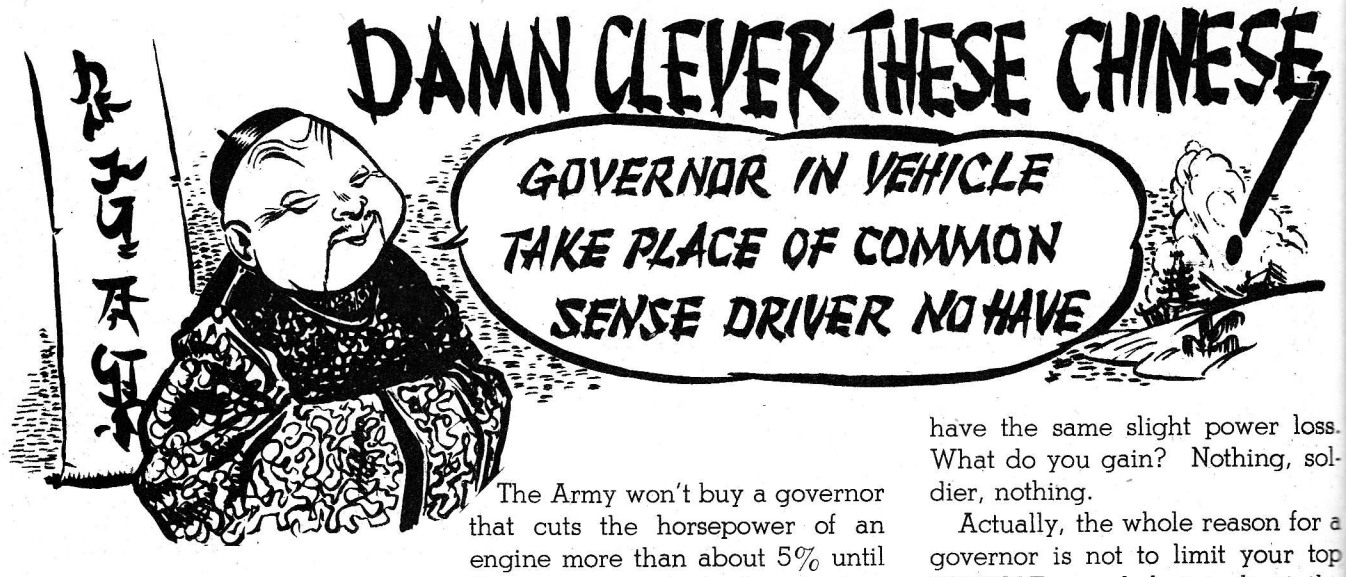
DAMN CLEVER THESE CHINESE!



Any of you drivers ever see a Chinaman fishing with Cormorants —you know, those long necked birds that dive into the water from the boat and snaffle the fish? Did you ever wonder what kept them from eating the fish, instead of taking them back and laying them in the fisherman's lap?

Damn clever these Chinese! They put a governor on the bird's throat — a ring big enough to let the small fish slip through into the belly but small enough to keep the big fish out so they can go into the fisherman's pot. The Cormorants get enough chow to keep them plenty happy, but not enough to get a bellyache.

The governor on your vehicle works the same way — it gives the engine enough gas to keep it happy, but not enough to ruin it. But some twerps in this man's army think they're pulling a fast one when they jimmy the governor. Soldier, it doesn't do you any good at all, but you probably won't believe it until we show you. O.K., here goes:—

The Army won't buy a governor that cuts the horsepower of an engine more than about 5% until the governor starts functioning. Most of the governors now being used, hold the horsepower loss to 2%. This means that the only thing a governor does is prevent excessive engine speed. With the exception of the 2% loss, a governor doesn't affect acceleration, pulling power or anything else. Of course, it stops you accelerating when you've hit the top governed road speed, but no one but a cowboy needs to step on the gas at that speed anyway.

Maybe you didn't know this: the rate of wear in an engine increases by the square of the engine speed. Which means that when you double the engine speed from 1500 to 3000 r.p.m., the rate of wear increases 4 times, and when you double it again to 6000, the rate of wear jumps to 16 times. To prevent this tremendous wear, most governors cut in at about 200 r.p.m. above the maximum horsepower speed of the engine.

And another thing: when you jimmy the governor, you're not helping yourself a darn bit. The restriction is still there, and you have the same slight power loss. What do you gain? Nothing, soldier, nothing.

Actually, the whole reason for a governor is not to limit your top VEHICLE speed, but to limit the top ENGINE speed — and the only reason for that is to stop the engine shaking its guts out when you're in low gear. If you're ever pulling up a hill and find the governor cutting in and out, you can bet you're in too low a gear and overreving the engine. So shift up a notch and see if you don't get the same results without punishing the engine.

Remember this: the governor can't control the speed of a vehicle when it's going down hill. It controls the throttle all right, but it can't control the engine speed because momentum has taken over and the wheels are driving the engine, instead of the engine driving the wheels. So if you're in too low a gear, the vehicle may have enough momentum to push the engine speed into the danger zone. This is happening plenty, either because some clucks don't know this, or don't give a darn.

If any of you are interested, here's how a governor works:—Many army vehicles have velocity operated governors, which have no

connection with any moving parts in the engine, need no lube and very little maintenance.

These governors are operated by the velocity of the fuel-air mixture as it is sucked by the intake manifold vacuum through the governor housing. The throttle shaft of the governor is slightly offset from the centre line of the throat, and operates the throttle plate. Both of these are similar to the carburetor choke and throttle, except that the governor throttle is set at an angle so that the flowing fuel mixture will open it. The harder you step on the gas, the faster the fuel mixture flows and the harder it hits the governor throttle, which starts swinging closed. The spring attached to the throttle shaft is adjusted so that its pull just equals the force of the fuel mixture on the throttle at the maximum engine speed desired. When you start pushing the accelerator beyond this set speed, the force of the fuel mixture overcomes the pull of the spring, and the throttle closes.

Another governor used by the army is the vacuum operated type which operates exclusively on the intake manifold vacuum of the engine. With an increase in engine speed as you step on the accelerator, the vacuum pressure decreases. This decrease acts on the piston which controls the degree of opening of the governor butterfly valve in the throat of the intake manifold. The tendency of the valve to remain open is due to spring tension, which is opposed by vacuum pressure acting on the governor piston. As the valve closes there is a restriction to the flow of fuel mixture and this means there is a definite control on the engine speed.

That's all there is to it, and if you want to go to heaven like a good fellow, LEAVE THAT GOVERNOR ALONE!

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MOTORCYCLES

Two little things on a motorcycle can start a train of events leading straight to ruin. One is a bad habit and the other is a bad adjustment. They both make for a bone-dry oil-bath air-cleaner. It goes without saying that a bone-dry air-cleaner lets dirt and dust sneak by to ruin the engine.

The first, the bad habit, is that of allowing your Harley-Davidson WLC "45" to park at an excessive angle. Maybe you park it on the side of a hill, maybe you park it so the jiffy stand is in a hole or mud or sand. Anyway, setting the motorcycle at an excessive angle, causes the carburetor to overflow. Gasoline spills into the hose and flows down to the air cleaner, and then your troubles begin. The gasoline fills up the oil cup and either dilutes or completely washes out the oil.

It splashes around in the pan for a while and shortly afterwards, evaporates. Results: the oil pan is as dry as your throat before pay day, your air-cleaner is non-composmentis . . . and your engine suffers the consequences of cylinder walls and pistons scratched and scored by dust and sand, bearings die like a dog from dirt in the oiling system, etc.

Don't play about with the Governor! As the stenographer said, you never know what it will lead to.

The second trouble — the bad adjustment — does exactly the same thing in the same way: by washing the oil out of your oil-bath air-cleaner.

It's bad adjustment of the float in the carburetor. The float being the gadget that regulates the level of gasoline in the carburetor, improper adjustment — or sticking —of it causes the level of the gasoline to rise to flood tide and slop over. Where does it go? The engine's not running so the easiest place for the gasoline to go (on the WLC "45") is down the hose and into the air-cleaner.

The oil pan is dried out as before.

The thing for you to do is whistle up an authorized motorcycle mechanic and have him check the carburetor float level (1/4 inch from the top of the bowl); see that the float is properly off-center to prevent sticking (3/64" to 1/16" off-center) and while he's at it, see if maybe the trouble is being caused by a bad needle valve and seat.

But at any rate, if motorcycling's your business, remember these two little things: the bad habit and the bad adjustment. Break one and fix the other.

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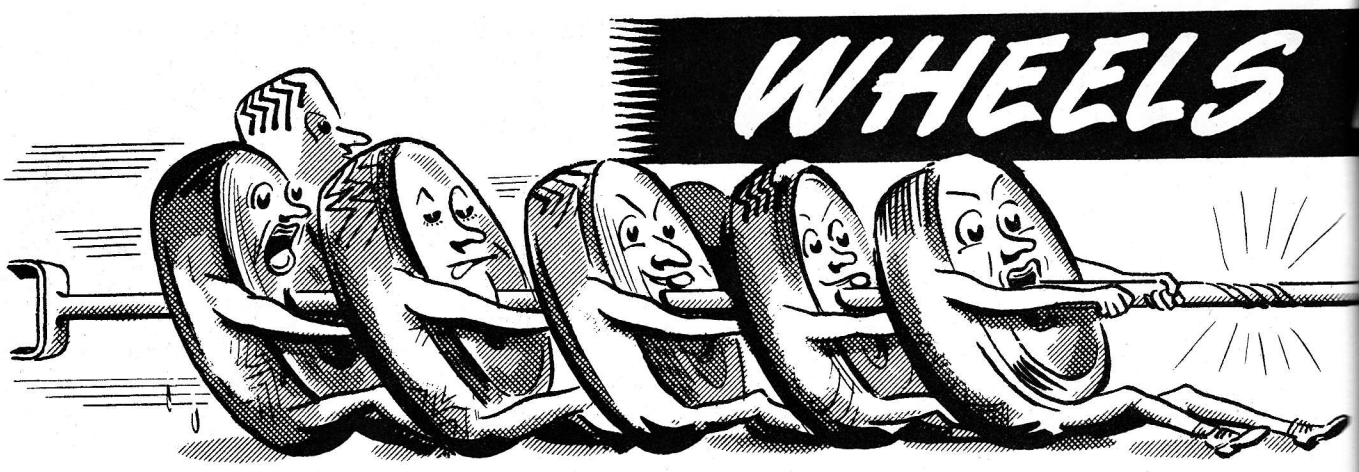


WHEELS

STOP THAT TUG OF WAR BY

A couple of angles on inflation that perhaps you haven't thought about.

This tire story is completely devoid of fantasy, glamour, fun and fancy endings — just the straight dope.

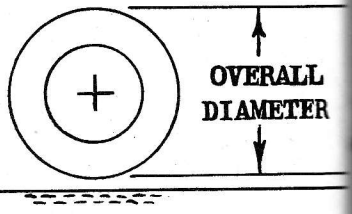
Here goes: a properly inflated tire mounted on a wheel but not resting on the ground, is perfectly round and has a definite diameter —called the **overall diameter** (Figure 1).

Figure 1 also shows the same tire on the road and carrying its rated load. It's flat on the bottom so naturally the overall diameter has changed. So let's take a point at the centre of the axle and draw a line down vertically to the ground. This will be the **loaded** radius. Obviously this loaded radius is going to change as the load is increased or decreased and as the inflation pressures rise and drop. Charts I and II show these variations in loaded radius, and also give the variations in the revolutions per mile per tire.

Now here's something else— wheel bearings are built to carry a certain load. Let's say that the outer bearings on a set of dual wheels carries 40% and the inner bearings 60%. If the inner tire goes flat or is considerably underinflated, as it frequently is, then the outer tire carries most of the load. That's tough on the tire— and tough on the outer bearing— it's staggering along carrying a load **four** times greater than its rated capacity.

If the outer tire is flat or underinflated, then the inner tire takes a beating and the inner bearing carries about three times more than it's supposed to. But that's not all — the axle is supposed to be supported by **two** tires, and when only one is doing the work, the axle starts bending. If it stays bent long enough and is subjected to shock loads, it'll have a permanent set in it — and then things do start going wrong.

In Army 6 x 6's, the two rear axles are connected by the propeller shafts through the transfer



TIRE OFF GROUND, NO LOAD

CHART I

Pounds Load	Pounds Inflation	Loaded Radius	Rev. Per Mile
1750	55	17.31	577
(2250	55	17.16	582)
2750	55	16.96	589
3250	55	16.80	594

Showing effect of varying loads with constant inflation —7.50/20-8 ply tire.

WHEELS

PERLY INFLATING TIRES!

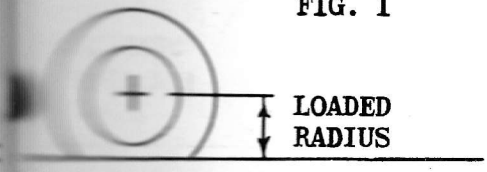
...Each pair of wheels should ...at the same speed, which ...the load radius of the tires ...be the same all round.

...the example of a truck with ...tires and a 6.6 axle ratio. ...wheels on the rear, rear axle ...582 revolutions per mile, ...the pinion shaft will make 6.6 x 582, or 3841.2 revolutions per mile. But if the tires on the forward rear axle haven't the same loaded radius as the rear ones, they'll make, say, 577 r.p.m. instead of 582, so the pinion shaft will make 6.6 x 577 or 3808.2 r.p.m. Take a gander at charts I and II and see what a small difference in the tire loaded radius will give this condition.

The two pinion shafts are connected, so there's no difference in their rotative speeds. So what happens when inflation isn't equal? Just this:—

The rear axle tries to over-run the forward axle and the forward axle tries to slow up the rear. The result is one grand "wheel fight."

FIG. 1



...ON GROUND, CARRYING LOAD

The flexible tire tread squirms and slips on the road, the prop shaft tries to wind up, the gear teeth are loaded to extremely high pressures, bearings are overloaded —and boy, grief is just around the corner.

The high gear teeth pressures tend to squeeze the lube out, and the steel-to-steel contact gouges the gear teeth till they look like a half eaten steak.

What happens to the tire tread is a sin.

As we said before, this tire story is devoid of fantasy and funny endings but it does have a **moral** hidden among the tables, diagrams and mathematics that have served to lead up to it. In fact, we don't mind if you forget we ever mentioned overall diameters, load radius or how many revolutions a 7.50-20 tire on a 6.6 axle ratio make per mile, so long as you remember the moral, and the moral is this—**If you want to be kind to wheel bearings, axles, and tires — Distribute your loads evenly—Keep your tire pressures even.**

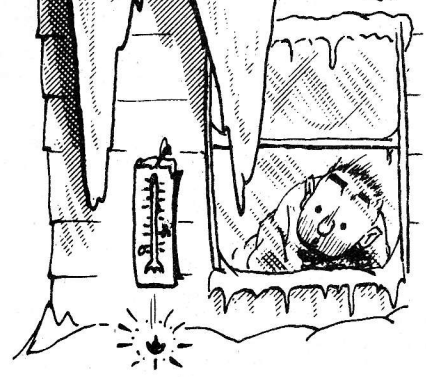
◈ ◈ ◈

CHART II

Pounds Load	Pounds Inflation	Loaded Radius	Rev. Per Mile
2250	40	16.93	590
2250	45	17.02	586
2250	55	17.16	582)
2250	65	17.26	579

Showing effect of varying inflation pressures with constant load — 7.50/20-8 ply tire.

WINTERIZE



**THE NORTH WIND DOTH BLOW,
AND WE SHALL HAVE SNOW,
SO WHAT WILL THE DRIVER DO THEN - -
POOR JOE!**

Elsewhere in this issue is a short story on storage of vehicles—however, we have more than a hunch that a goodly portion of vehicles will continue to be operated come zero and high snow drifts so a word or two on being prepared will not come amiss.

If when you received the official Service Information Bulletins on winterization of vehicles, you were tempted to use them for winterizing the cracks around the shop windows — don't. They cover a lot of territory 'tis true, and you may feel that some of it is too much of a good thing just because the weather-man will be guessing in lower figures than last month.

Just r e m e m b e r that winter weather, like beautiful blondes, brings out the worst in any vehicle.

Any and all minor weaknesses present now, grow to big troubles when colder weather comes. She may perk along all summer with a generator that isn't quite giving its all, or points that are not in their heyday. Comes the first frosty dawn and you're without juice for the starter, without sparks for the plugs and without in the cold trying to get life into a vehicle that just isn't interested.

So don't miss a digit in following the tried and true procedure as spelled out in the bulletin.

Most of the items listed for attention are obvious in the necessity for them being in first class shape for winter operation — like battery servicing or checking the cooling system for leaks. It's a bit of homey philosophy to say it's no use putting anti-freeze in one end if it's going to run out the other. That just creates a false sense of security at a most inopportune time.

Other items don't slap you in the face quite so obviously — such as checking the adjustment of the drive chains on a motorcycle—naturally it's sound practice to keep drive chains properly adjusted at **all** times otherwise they wear out fast or break at nasty moments, but loose chains also cause snatchy and jerky running and with the roads camouflaged as skating rinks the smoother the power flow and the slower you can ride without snatch — well, you've got imagination too.

Brakes too — brakes that grab or pull to one side on slippery roads. A toboggan is on rails compared with a truck trying to come to a peaceful stop with badly adjusted or defective brakes and if, after you've carefully tuned up your brakes you neglect your tire pressures — you're back in the same snow bank.

The point we're trying to hammer is that **all** the items that are mentioned in the winter servicing bulletins are necessary for the safe and proper operation and maintenance of your vehicle during the winter—and don't forget that the bulletins are written on the assumption that the regular compulsory Preventive Maintenance Schedules are being carried out properly — the winter servicing bulletins just "add that touch that means so much! ! !"

Don't get the idea that winter servicing is just a gag — a diabolical system designed solely to keep you away from your comic papers. No, it has a loftier purpose — to preserve valuable equipment, provide you with the maximum protection against poor driving conditions and to safeguard your hide and your sergeant's good humour over the Christmas season and the cold weeks that follow.

A BATTERY
with a Specific Gravity

of 1.125	freezes at	13°	above	zero	
" 1.150	"	" 5°	"	"	
" 1.175	"	" 4°	below	zero	
" 1.200	"	" 16°	"	"	
" 1.225	"	" 35°	"	"	
" 1.250	"	" 62°	"	"	
" 1.275	"	" 85°	"	"	

Pouring Anti-Freeze

You might accuse us of splitting hairs if we went so far as to give you detailed directions on how to pour a liquid from a can. But some things that turn up reveal that a lot of people are totally unfamiliar with the fine art of pouring from cans. And because of that, a lot of trouble — not to mention waste — is brewing.

It seems that the salvage people upon receiving a great many old Prestone cans turned in for scrap, often find a more or less thick, syrupy mess still remaining in the cans. Being of a curious turn of mind, they investigate and discover that the syrupy stuff is Prestone that hasn't been completely poured from the can.

But more than that, they would discover upon reporting their findings to a Chemistry Lab, that the thick residue contains a large portion of the inhibitor belonging to the Prestone solution.

In other words, a lot of people were pouring Prestone into their cooling systems and due to a little misunderstanding, were leaving behind a lot of the valuable inhibitor which is the important ingredient protecting the cooling system from rust and corrosion.

If you look at the Prestone container, you'll see at the top of the can, two little spots at diagonal corners marked, "Vent here," and "Pour here." Now if you'll turn the can over so that the label is upside down, you'll see in the bottom of the can, what looks like a plug, or a pressed-in cap in the center.

If you're like a lot of other forthright guys in the field, this pressed-in cap on the bottom of the can will mean only one thing to you: a place to pour from — in spite of the two places marked "vent" and "pour" on the top of the can.

So you go ahead and knock out the plug and pour. But you can't get the entire contents of the can out through this hole. The result is that you leave a certain amount of the Prestone in the can — and that certain amount is composed largely of the valuable rust inhibitor without which your anti-freeze will do only half its job.

Of course, you might ask why in the hell was the pressed-in cap put in the bottom of the can in the first place? The answer is, that's where the manufacturer filled the can at the factory — and any similarity to pouring vents is strictly coincidental. It was never intended to be used for pouring.

So far this all might sound to you like something right off the end of the pitchfork, and hardly worth mentioning. But when we tell you that salvage people have discovered valuable "leftovers totaling 50 gallons (and at this one depot, remember) you'll begin to understand that a lot of trucks were running around with a goodly portion of the inhibitor that should be in their cooling systems, still reposing on the inside of the cans they threw away.

For some of you it might be a little late in the season for us to be telling you all this, but if you're in a climate where you haven't had to install anti-freeze yet, you might remember this when your turn comes.

And the next time you pour anything out of a can — especially a Prestone can — follow the manufacturer's directions: "Vent here," and "Pour here." And to be on the safe side, flush out the can with water and pour the flushings into the radiator.

◆ ◆ ◆

SAM

Now a tyre that is under inflated
Gets a terrible strain on its guts,
Whilst one that's too 'ard isn't comfy
And'll rattle and loosen the nuts.

But Sam never went by 'arf measures,
"If they're soft then they bust," sed my lord,
"So I'd best put the wind up 'em proper."
And 'e blew 'em as 'ard as a board.

At this juncture the lads in the corner
All started to snigger wi' glee,
"This is going to be good," said the leader,
"Hold yer 'ats on and wait for it, see—"

Now yer know them red nuts on the wheels, lads?
They're red for a purpose o' course,
The colour's a guide to the gormless,
Meanin' "Danger," "Keep clear," "Old yer 'orse."

Well, Sammy sublimely unconscious,
Were changing a wheel for a spare,
He were undoin' nuts wi' abandon,
Wi' naught in the world for a care.

Well, the flange caught 'im right on the 'kisser';
'E went 'earts over ribs on the earth,
And the audience there in the corner
Nearly died with convulsions of mirth.

"I'm forever blowing GASKETS"

Shame on the guy!

After all the many gadgets and more or less complicated functions of an engine you wouldn't think he'd let a plain simple head gasket get him down.

But that's the way it is. To quote an old saying — the simplest looking things sometimes cause the most trouble — and what could be more simple looking than a head gasket says we (knowing we'll never get our picture in the paper).

Take the bloke who needs a head gasket right away and he doesn't have the specified one available. He roots around and first thing you know he has his flippers on one that looks like it might fit. So grabbing it he fits it onto the block and everything looks fine — it even has some extra holes thrown in free of charge.

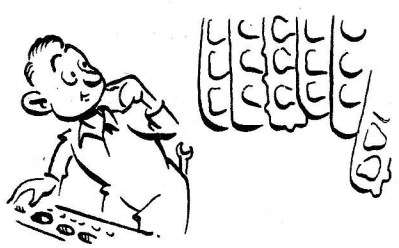
Which may be all well and good for a few days, then in comes the driver complaining that the truck has as much pep as Saturday night in the morgue. And this is the point where they grab the guy that put the gasket on and lead him over to show him what happened (beating him rapidly about the ears with a rubber hose as they come).

This is an overhead valve engine they say — the valves are in the head, not in the block. There are water passages to cool the valves— these are also in the head, naturally. Now, when you slap this gasket onto the block without looking to see what holes and passages were in the head you closed off some of the passages in the head because the gasket did not provide holes for same.

In other words, the cooling water couldn't flow up from the block to the head, because the gasket (which didn't provide holes) wouldn't let it through.

Dope, they say to the culprit, we ain't complaining because you didn't use the exact gasket specified. We don't mind if you get suddenly thrifty and use a 1941 gasket on a 1942 engine. But if it's an overhead valve engine, match the gasket holes up with the holes in the head. Then if it fits, put it on the block.

Likewise with the water pump gasket. Match the gasket to the block, not to the pump itself. Many times the pump has a small hole and the block a large one. In this case the gasket laps over, the circulating water tears it off and you have pieces of gasket clogging narrow passages. Gaskets should always be compressed between two surfaces, without any edges lapping over.



But coming back to head gaskets — don't be taken in by the temptation to use an old head gasket a second time. Although you can't see it with the naked eye, the asbestos in a used gasket is packed hard in spots. A gasket has to be soft and flexible enough to fill the uneven spots that occur in even the smoothest surfaces. You can't see them without a microscope but they're there.

Another thing you might not like but which is none the less true, is the fact that you're not supposed to use a sealing compound with a head gasket. The gasket is supposed to do the perfect sealing job — in cases where the surfaces are too uneven or warped, a refacing job is in order. Remember that the sealing compound you've been using might be soluble in water — or maybe the anti-freeze will attack it. In which case, you've got a blown gasket.

Spreading a bit of grease over the surfaces will make your gasket

(Continued on Next Page)

There's a certain little toy in your shop that's turned out to be a snake-in-the-grass.

It's the air gun: so convenient and satisfying to use, that it's often employed on jobs where it's worth getting poison. In fact a blast instrument can't wreak more havoc.

Carburetor (and other) air-cleaner elements are a favourite target of blow-gun fiends. Holding the copper-wool element in one hand, they blast away with the air gun in the other. The holes that appear in the element as a result of this close-up action, make it next to useless — take it easy on those elements, Bub!

The hurry-up Harry's are another variety of air-gun addict. Dissatisfied with the law of gravity as presently amended and enacted, they apply the air gun to the filler holes of various gear cases to make the pressure drain the oil faster. This is one of the quickest ways we know of to blow the oil seals. And it's entirely unnecessary because the heaviest gear lubricant we're using in gearcases now is DND 390, which, when warm, drains without any trouble.

Using an air gun to blow out clogged fuel lines is an ancient and —if tactfully done — honourable practice. But what do you think of the yahoos who apply the gun to the fuel tank and build up pressure without detaching the other end of the line at the fuel pump? We get plenty of fuel pump diaphragms blown out that way!

The bearing-spinners deserve dishonourable mention. These are the dumguards who like to see how fast they can make the balls spin with an air gun. When they've found out, they might as well throw the bearing away. An air gun can make a ball bearing spin up in the tens of thousands of rpm's and any dirt in the bearing—or even the dust in the air — acts as an abrasive which at this high speed quickly ruins the bearing.

The list of blow-gun malpractitioners is as long as your arm and includes the guys who use it around open engines and machinery and blow dust and dirt into close-fitting parts. And then there's that worst of the breed, the practical joker. But that seems to be the way with any good useful tool. There are always some guys who'll abuse it.

Who was it called them "hammerheads?"

(Cont'd)

...more evenly, easily and per-...into place. But under any ...circumstances, don't forget to clean ...surfaces perfectly. A little ...dirt will cut into the copper ...asbestos of your gasket and ...a channel for compression ...A little leak leads to a big ...—a big leak gets you no-...

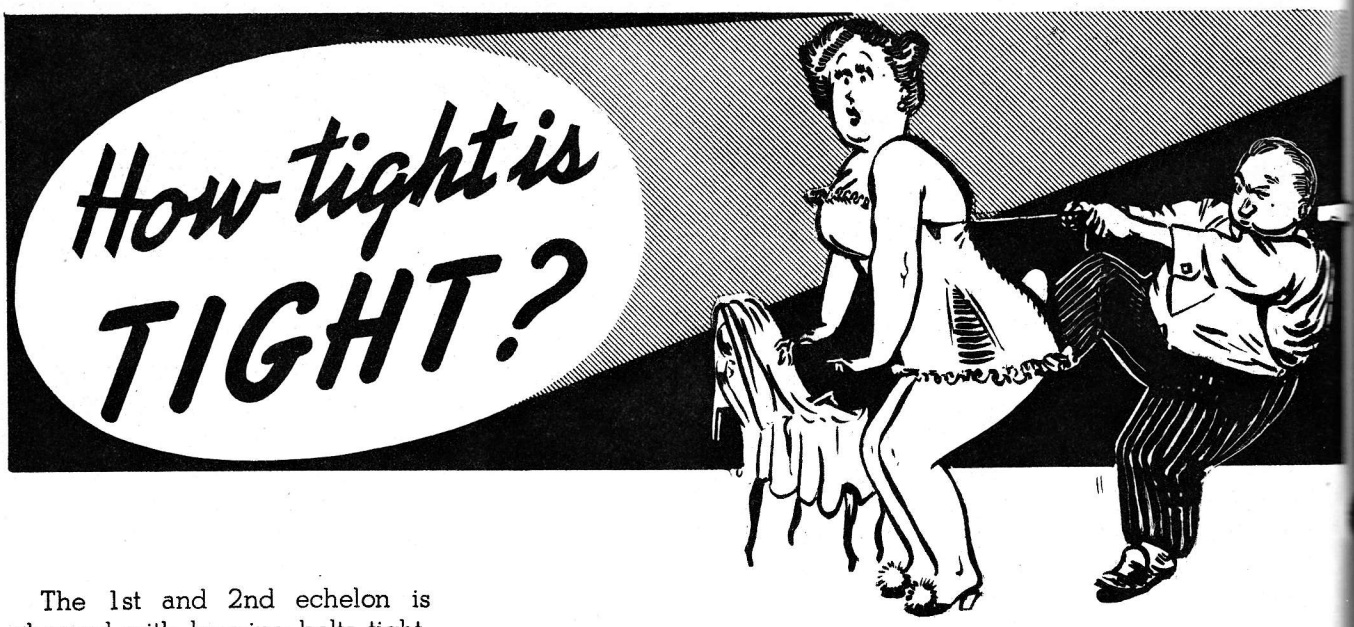
Talking about leaks, the best ...come from not tightening ...the head properly. Using a ...wrench and following the ...manufacturer's manual on ...to be applied, and se-...to be followed, tighten the ...down to uniform pressure when the head is cold. Then with CAST IRON HEADS, run the engine until normal operating temperature is reached and bring the stud nuts up to the proper tension while the block is still hot. With ALUMINUM HEADS, run the engine up to normal operating temperature, let the block cool and tighten nuts to proper tension.

If your head has bolts instead of studs, make sure there's no dirt or carbon in the bolt holes. Otherwise you won't be able to tighten the bolts properly.

When you fit the gasket down over studs, do it gently, (especially if oversize studs have at one time or another been inserted), or you'll break the copper or asbestos edges of the gasket holes. This opens the way for your gasket to blow out.

Anyway, it all boils down to this —though it might seem child's play to put a gasket on, don't let it fool you. Overconfidence is a bad thing.

◆ ◆ ◆



The 1st and 2nd echelon is charged with keeping bolts tight. This includes body bolts; cylinder head bolts; engine mounting bolts; manifold and carburetor nuts and bolts; clutch, transmission, and primary-chain-cover nuts and capscrews.

But how tight is tight?

In a good many cases, the maintenance manuals carry torque specifications stating exactly how tight a given nut or bolt should be. For instance, the manual will always specify the proper torque to be applied to cylinder-head bolts and the exact pattern to be followed in tightening the bolts.

But in many other cases, tightness is left to "feel." The driver or mechanic is supposed to use the sense of touch in his good right arm. If the sense of touch is so slightly developed by training and experience that the nerve ends quiver with joy at the mere approach of a wrench, all is well and good. But if all that a man has in his arm (and head) is muscles, then look out!

Brute strength or the Lionel Strongfort method of tightening bolts will, paradoxically enough, lead not to tightness — but to looseness. Put blind, brute force on a bolt and you'll strip the threads. A bolt with stripped threads will no more hold than a busted girdle, and the part it's supposed to be holding will tinkle loosely in the wind. Not only that, but careless or ignorant tightening may twist off a bolt deep inside an assembly, giving the unfortunate mechanic one holy time getting it out.

Just recently we got a report that the bolts of the spring rebound clips are being tightened too much. The bolt threads fail and the clips won't hold. This allows the spring leaves to shift or even break. Weak, broken or shifted spring leaves lead to all kinds of trouble: the axle may shift completely out of line or the steering control completely out of the hands of the driver.

Another item: the axle-flange bolts of most Vehicles are supposed to get only 35 to 40 pounds of torque. They are capscrews and won't take much more than that before breaking off. Furthermore, they won't break off at the cap—they break off deep inside where it's torture to get them out.

Follow the torque specs whenever they're available for tightening capscrews.

How tight should you draw down the wing nut on the top of the carburetor air-cleaner? The answer is—Using your fingers, tighten only enough to hold the cover securely in position. Don't use pliers — you'll warp the cover, and allow air to sneak in under the cover and directly down into the throat of the carburetor, bypassing the cleansing oil bath or element.

Strong words have been written calling attention to the necessity of keeping the cab mounting bolts tight. They warned that loose mounting bolts would cause the cab to shift, with steering column breakage quick to follow.

But here's a funny thing: a man may tighten the cab mounting bolts with doglike devotion and still they seem to be forever loose. The reason for this is peculiar. As the truck rides along, the cab gently bounces and vibrates; the bolts subjected to alternate stress ("hysteresis") grow and elongate. The bolts stretch a little, and then they stretch some more. The driver comes along, swears black and blue that he tightened the bolts just last week, and here they are loose again. This sort of horseplay

may go on until bolts that were originally three inches long, have stretched to six inches. (Believe it or not.)

There's not much you can do about stretched bolts except keep tightening them. That's the best advice anybody can give you: keep tightening them. However, don't forget that some cabs are spring mounted — don't pull **them** up tight or you'll defeat the purpose of the springs.

How many "overhead-valve" engines have you seen with oil leaking out from under the back of the valve cover? The gasket may be new and fresh but still the oil dribbles out like it was free.

Blame it on ignorant tightening. On certain types, if the hold-down nuts are over-tightened, the valve cover gets distorted or sprung, leaving plenty of room for the oil to leak out.

Proper tightening of these valve-cover-hold-down nuts depends on "feel." Tighten the nuts down as far as you can with your fingers, then — and here's a little trick — press the valve cover down with your other hand. Using your fingers again, give the nut one more full turn. When you release the valve cover, it'll have the proper tightness. Or if you've got a good sense of touch, screw the nut down with your fingers, then with a wrench, tighten it until you feel it crushing the gasket — and no more.

But don't tighten the nuts until the valve cover doubles up in pain and lets the oil leak out.

Nuts and bolts — big bolts, little bolts — as far as the eye can see, all over the vehicle. Each one poses the question, how tight is tight? Sometimes the answer is in the maintenance manual, most times it's in the hairy right arm of the driver or mechanic.

The wise M.T. sergeant will begin immediately to do himself and his boys a favour by schooling the good right arms in his organization in the delicate art of "feel."

—(Cont'd from Page 20)—

while it's draining. Take out the filler drain plug, too — as we seem to have said before. There should be no need to flush the crankcase with the new detergent type oil.

3. Replace the crankcase and filler drain plugs. We needn't mention why that's a good idea.

4. Refill the crankcase (to the FULL mark on the gage) and run the engine for a few minutes. Refill, of course, with new Oil Engine H.D., the grade specified for the particular vehicle and season. See your Canadian Army Lubrication Guide.

5. Stop the engine and recheck the oil level. If it's still FULL, swell. If it isn't, add more engine oil as required. (There are exceptions to this, such as certain Dodge vehicles. When their oil level is rechecked, it should be at running level, half-way between the FULL and the ½-FULL marks. But unless your Lubrication Guide tells you that, the level shouldn't be below FULL.)

6. Keep everything "hospital clean" during the whole procedure. This is terrifically important. Too many grease-balls throw more sand, pine-needles, and assorted junk into the engine with the new oil than they remove by draining the old. So make it a habit to clean all oil measures, filler spouts, funnels, and containers — before the new oil comes near 'em.

◆ ◆ ◆

Our eye fell on five little bottles full of honey-coloured liquid standing on somebody's desk the other day. Glancing around quickly and cautiously, we pulled the cork on one of them and took a swift swallow.

It turned out to be engine oil.

"For cripes sake, McWortle," we shouted angrily at the guy on whose desk the bottle stood, "what's the big idea!"

"Oh shut your big trap," McWortle said, "those are samples of oil taken at random from five different trucks."

"I don't give a good g . . ."

"Notice that grey sediment at the bottom of each of the test tubes?" McWortle continued, "that's lead—from gasoline. Notice the red colour of the oil? That's dye from the gasoline. It comes from driving with the choke out."

"I don't care if they drive with their tongues out!"

"Driving with the choke out," McWortle said, talking to the wall, "forces too much gasoline into the combustion chamber. The gasoline spills down past the rings and on down into the engine oil)—dilutes it, ruins it."

"Is that a fact!" exclaimed the wall, "and the lead in the gasoline accumulates in the oil."

"The lead probably wouldn't hurt anything," explained McWortle,—"the diluted oil does all the damage—but it's a good tipoff to excess choking."

"Unbelievable," said the wall.

"Oh, a lot of funny things have happened around here," murmured McWortle busying himself in the papers on his desk.

HOW'S YOUR FIRE EXTINGUISHER?

EVERY DAY, LOOK AND SEE —

IS IT FILLED?

Shake it and listen. When refilling, use Fluid recommended by the Extinguisher Manufacturer (obtained from R.C.E. in 1 quart refills). Be sure the handle is locked after filling, or fluid will leak out.

IS IT CLEAN?

Look at the nozzle closely. A clogged nozzle won't squirt.

DOES IT PUMP FREELY?

Don't pump it every day; that's a waste of fluid. Instead, look for damage such as a bent handle or dented cylinder, and pump it only if you find new damage.

IS IT SECURELY MOUNTED?

If it's loose, it will soon be battered and dirty — or maybe lost.

DOES IT LEAK?

Shake after handle is in locked position to determine whether lock is leak-proof. Defective seals on locks often allow fluid to escape while being transported in the vehicle rack.

Every Month, Make This Test

1. Smell the fluid to make sure it's pure uncontaminated carbon tetrachloride.
2. Squirt some of the fluid into a clean, dry container.
3. If the fluid is clean, pour it back into the extinguisher.
4. If the fluid is dirty, empty the extinguisher and fill with clean fluid.
5. If the extinguisher won't pump, get Supply to swap it for a new one.

NEVER ALLOW ANY WATER TO MIX WITH FIRE EXTINGUISHER FLUID (CARBON TETRACHLORIDE). IT WILL FORM HYDROCHLORIC ACID, WHICH IS CORROSIVE AND WON'T PUT OUT ELECTRICAL FIRES.

DO YOU KNOW?

Do you know the best way to blow grease seals on differentials, transmissions, and transfer cases? Just let the vent plugs get clogged, that's all. Excessive pressure will build up inside the gear case, and goodbye grease seals. Just pay a little attention to the vent plugs, fellows, and you won't have to worry about blown seals.

◆ ◆ ◆

We've heard rumours that some of you men are using the winch on the Diamond 4-ton wreckers with the transmission in 1st gear. And with a light load, too.

We're surprised at you. You know this results in excessively high engine rpm's to get satisfactory cable speed. No engine should exceed 1000 rpm when winching.

If you're winching a light load place the transmission in 3rd or 4th gear. If you're working on a heavy load, of course you can shift to a lower gear. But always select a gear high enough to give you the proper cable speed, without having to rev up the engine.

This same procedure for operating the winch under load holds true for all winch-equipped vehicles — not just for the Diamond-T alone. The important thing to remember is to use the highest gear possible and not to race the engine to speed up the winch.

Say, fellows, our mail bag is so light you could use it for a barrage balloon — How about dashing off a note for us? Skip telling us about the weather — but give us the dope on any Technical ideas or suggestions you have. Got a gripe, or a problem? — Maybe we've got the answer — write us anyway — we like getting mail —

METAL WORKERS TEMPERATURE GUIDE

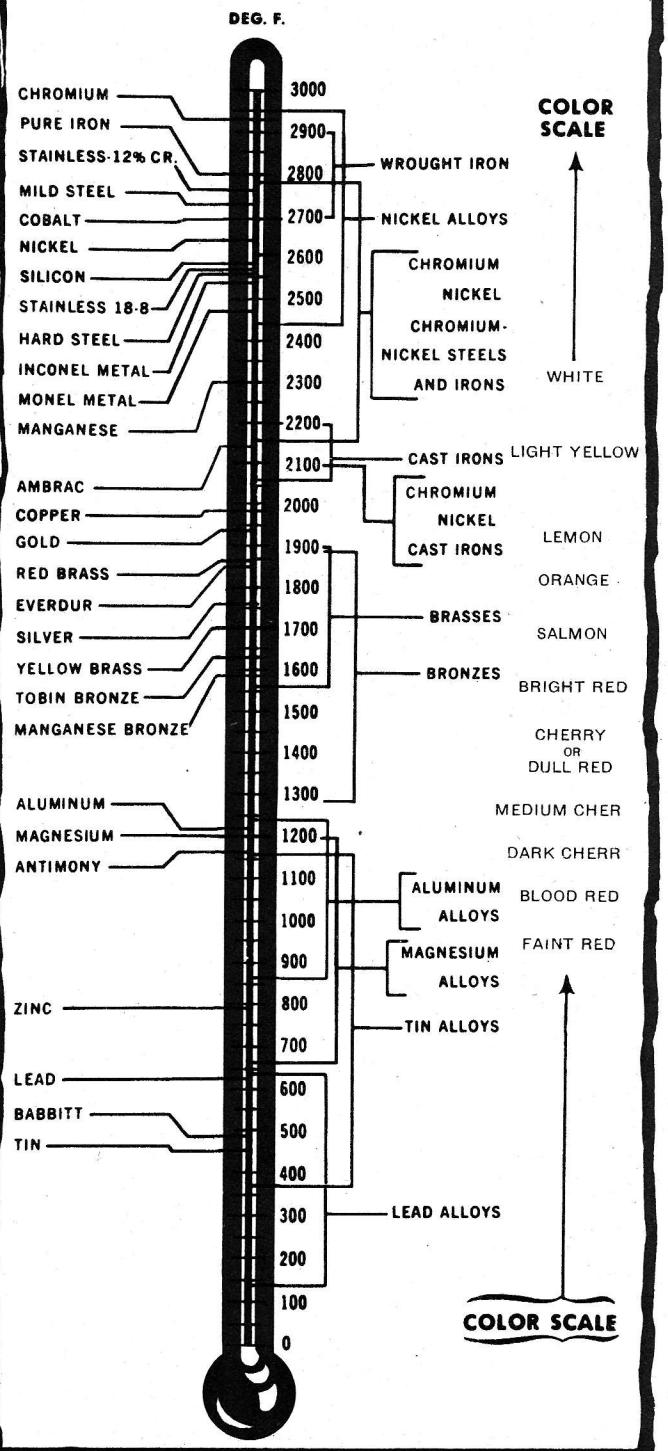
The chart at the right is of particular value to all welding operators and blacksmiths. Reference to the chart reveals that aluminum and aluminum alloys, because of their low melting points, give little or no indication by change in colour when they approach the melting point. Conversely, the high melting point of wrought iron is reached at a white heat, cast iron at "yellow" and so on.

Thus, temperatures may be estimated for all practical purposes from these various colours. Where it is necessary to preheat before welding, say 1000°F, actual temperature reading may be impossible while a glance at the chart reveals that the part being welded would be blood-red at that point. With a little experience, the metal worker will be able to estimate temperatures to a fairly close degree under field conditions.

It is important not to confuse the colours given in this table with the colours of the oxides which are formed on iron and steel at low temperatures; that is, at temperatures ranging from 400° to 600°F. At approximately 400°F, the oxides formed on highly polished steel are a faint straw colour; at 440°F, a straw; at 480°F, a deep straw; at 520°F, brown; at 540°F, a purple; and at approximately 600°F, a full blue. A knowledge of the temperatures at which these oxides form is very useful in tempering hand tools such as chisels and punches.

Don't cut this chart out of the magazine. Write us, and we'll send you a bigger one all for your very own.

MELTING POINTS OF METALS AND ALLOYS OF PRACTICAL IMPORTANCE



FOR USE IN FAIRLY DARK PLACE WITHOUT WELDING GOGGLES.

These gentry are well known characters. Their list of destructive crimes is as long as a wet week. But they are not such tough customers to catch. They like to sneak in when you aren't looking and turn up in places where you don't expect them. Experienced "mechs" know their habits quite well—and regular inspections and checks will catch them everytime. With constant watching, they can't flourish and ply their trade of damage and destruction. In sandy or dusty areas they're persistent customers but by keeping parts wrapped, containers covered and checking filters often, you'll keep these guys where they'll do the least harm. But give them half a chance and it's murder all over the lot. Don't be an accessory to these vandals—catch 'em and give 'em the rush—remember—

CRIME DOES NOT PAY!